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CLAIMS

[Claim(s)]

[Claim 1]A battery cell and the circuit board electrically connected to each terminal of this battery cell, A battery with which it is a battery unified by a resin molding part which wraps in this circuit board, and a resin molding part has stuck at least some walls of a container which constitutes a battery cell to a projecting wall part made to project from the one adjoining surface which adjoins this wall.

[Claim 2]The battery according to claim 1 formed in a position which said projecting wall part counters across said adjoining surface two places.

[Claim 3]The battery according to claim 1 or 2 with which said projecting wall part is provided in the circumference on said surface of adjoining over the perimeter.

[Claim 4]Are a manufacturing method of the battery according to any one of claims 1 to 3, and said circuit board in the state where it electrically connected with each terminal of said battery cell. A manufacturing method of a battery which pours in and stiffens melting resin in a cavity demarcated around the circuit board using said adjoining surface and said projecting wall part.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]Especially this invention relates to the art which improves the reliability and productivity of a battery about the manufacturing method of a battery and a battery.

[0002]

[Description of the Prior Art]Conventionally, the battery used for personal digital assistants, such as a portable telephone and a personal handy phone machine, is equipped with the battery cell of approximately rectangular parallelepiped shape, and the circuit board electrically connected to each terminal of this battery cell, and there are some which fixed these in one with resin in it.

[0003]Said battery cell is constituted by enclosing with an electrolysis solution what laminated the anode film separated with the separator in the container which carries out deep drawing of the aluminum material, and the two or more layers negative-electrode film with an obturation board. The negative pole terminal is arranged by state protruding in that center at this obturation board.

[0004]Said circuit board is a thing for the charge control of a battery cell, and electrical protection. The surface of said battery cell is pasted with the double-sided tape.

The flat side is chosen in order to secure sufficient adhesion area by a double-sided tape, while being considered as the side in which the thickness direction of a battery cell is met, in order to prevent the thickness of a battery from increasing the adhesion position to the battery cell of the circuit board. The circuit board is attached to the side contiguous to a negative pole terminal from the necessity of connecting with the negative pole terminal which projects in the one side face of a battery cell.

[0005]The circuit board is connected to each terminal of a battery cell by metal connection plates. This connection plate is prolonged toward the adjoining negative pole terminal and positive pole terminal of the side, respectively from the both ends of the long and slender circuit board allotted covering the overall length of a battery cell.

By carrying out soldering of each tip to each terminal, the circuit board and a battery cell are connected electrically and mechanically.

Therefore, these connection plates will be arranged so that said battery cell may be held. And the circuit board and the connection plate which were fixed in this way are wrapped in by the resin molding part, and are united with the battery cell.

[0006]

[Problem(s) to be Solved by the Invention]However, in the conventional battery constituted in this way, since the circuit board and a connection plate were arranged on the side of the battery cell, the surface of a battery cell will be covered with the circuit board or a connection plate, and there was a problem that adhesion area with a resin molding part decreased. For this reason, a resin molding part may drop out with external force. Since the resin molding part was fabricated covering the 3 sides of a battery cell, the battery cell needed to be made buried in the inside of a metallic

mold, and the resin molding part needed to be fabricated. For this reason, the metallic mold which has complicated cavity form was used, and there was a problem that the product cost of a battery became high. This invention is made in view of the situation mentioned above, and aims at improvement in the reliability of a battery, and productivity.

[0007]

[Means for Solving the Problem] In order to solve an aforementioned problem, an invention concerning claim 1, A battery cell and the circuit board electrically connected to each terminal of this battery cell, It is a battery unified by a resin molding part which wraps in this circuit board, and a battery with which a resin molding part has stuck at least some walls of a container which constitutes a battery cell to a projecting wall part made to project from the one adjoining surface which adjoins this wall is proposed.

[0008] According to this invention, adhesion area of a battery cell and a resin molding part can be made to increase, when the surface of a battery cell and an inner surface of a projecting wall part paste a resin molding part. A rigid high projecting wall part can be made to support the side of a resin molding part. As a result, adhesive strength of a battery cell and a resin molding part is increased, and it becomes possible to hold so that a resin molding part may not drop out of a battery cell to the side to this external force in a resin molding part.

[0009] An invention concerning claim 2 has proposed a battery formed in a position which said projecting wall part counters across said adjoining surface two places in the battery according to claim 1. According to this invention, a resin molding part inserted into two projecting wall parts which counter, A resin molding part is supported to external force concerning direction opposing of these projecting wall part, and it can project with a resin molding part also to external force of a direction which intersects perpendicularly with this, adhesive strength with a wall can be heightened, and mounting strength of a resin molding part and a battery cell can be improved further.

[0010] An invention concerning claim 3 has proposed a battery with which said projecting wall part is provided in the circumference on said surface of adjoining over the perimeter in the battery according to claim 1 or 2. According to this invention, it can project, the side of a resin molding part can be covered with a wall over the perimeter, and external force can be prevented from being directly added to this side.

[0011] It is in a state which an invention concerning claim 4 is a manufacturing method of the battery according to any one of claims 1 to 3, and electrically connected said circuit board to each terminal of said battery cell, A manufacturing method of a battery which pours in and stiffens melting resin in a cavity demarcated around the circuit board using said adjoining surface and said projecting wall part is proposed.

[0012] According to this invention, by demarcating a cavity using a projecting wall part, a cavity surface formed by a metallic mold can be lessened, and a metallic mold can be made simple. If it projects over the perimeter on the surface of adjoining and a wall is formed especially, a cavity surface which should be formed with a metallic mold is set to one, and can use a metallic mold of simple shape like a lid which closes a tip opening of a projecting wall part instead of a metallic mold which wraps in a battery cell.

[0013]

[Embodiment of the Invention] Hereafter, one embodiment of the battery concerning this invention is described with reference to drawing 9 from drawing 1. Drawing 1 is a perspective view showing the appearance of the battery 1 concerning this embodiment. The battery 1 is used for personal digital assistants, such as a portable telephone, and is constituted by the battery cell 2 and the resin molding part 3.

[0014] The battery cell 2 is a lithium ion battery, and as shown in drawing 2, it has the container and the obturation board 2a of rectangular parallelepiped shape made from aluminum by which deep-drawing shaping was carried out, for example. The separator and electrode which are not illustrated are enclosed with the inside of said container with the electrolysis solution. Said obturation board 2a

is a lid-like member for sealing the opening of this container.

[0015]It projects in the center section of the obturation board 2a from the surface of this obturation board 2a, and the negative-electrode cap 2c is formed in it. The negative-electrode cap 2c is electrically insulated to the obturation board 2a. Said obturation board 2a constitutes one on the surface of the minimum area among the surfaces of the battery cell 2 where a project area is the smallest.

[0016]The obturation board 2a was inserted from the opening tip of a container to the position of a prescribed depth, and has sealed the container by carrying out a girth weld to a container there. That is, the obturation board 2a constitutes the adjoining surface contiguous to the container wall side of a battery cell, and constitutes projecting wall part 2b in which the portion from the obturation board 2a to an opening tip projects from the adjoining surface among container side walls. In the battery cell 2 constituted in this way, all the other surfaces where the negative-electrode cap 2c contained the obturation board 2a and projecting wall part 2b as a negative pole terminal function as a positive pole terminal, respectively.

[0017]Said resin molding part 3 has wrapped in the circuit board 4 and the connecting members 5 and 6, as shown in drawing 2. The circuit board 4 has the area of the grade which is less than the size of the obturation board 2a of the battery cell 2, and carries the connector 7 grade suitable electronic parts and for external connection. These electronic parts are parts for performing charge control of the battery 1, etc. Said circuit board 4 counters the obturation board 2a of the battery cell 2, and is arranged, and it is connected to the battery cell 2 via the connecting members 5 and 6. The contact button 4a and the connecting hole 4b as shown in drawing 3 are established in the circuit board 4. The wiring (graphic display abbreviation) led from said connector 7 grade is connected to the contact button 4a and the connecting hole 4b.

[0018]The connecting members 5 and 6 bend metal plates, are formed in the shape of an L character, and are electrically connected to the positive pole terminal and negative pole terminal of the circuit board, respectively as shown in drawing 3. The connection projections 6a for inserting in the connecting hole 4b of the circuit board 4 are formed in the end of the connecting member 6, and it is electrically connected to wiring of the circuit board 4 by inserting these connection projections 6a in the connecting hole 4b, and attaching by soldering etc.

[0019]According to the battery 1 of this embodiment, the resin molding part 3 is surrounded by projecting wall part 2b of the battery cell 2 in the circumference. As a result, the side of the resin molding part 3 is not outside exposed, and external force is not directly added to this side. Since rigid high projecting wall part 2b supports the resin molding part 3, even against the external force which acts on the resin molding part 3 indirectly, the resin molding part 3 can be protected and it can prevent the resin molding part 3 dropping out of the battery cell 2.

[0020]Since the placed opposite of the circuit board 4 is carried out to the minimum area surface of the battery cell 2, it can make volume of the resin molding part 3 small rather than arranged on which other surfaces. For this reason, the increase in the volume of the battery 1 is suppressed to the minimum, and the small weight saving of the battery 1 can be realized. Since there is little quantity of the resin which the resin molding part 3 takes and it ends, product cost is reducible.

[0021]Next, the manufacturing method of the battery 1 in this embodiment is explained using drawing 9 from drawing 4. In order to manufacture the battery 1 of this embodiment, the connecting members 5 and 6 are first attached to the inner surface of projecting wall part 2b of the battery cell 2, and the negative-electrode cap 2c by spot welding or soldering, respectively (drawing 4).

Subsequently, it is made to slide in from the slanting upper part, and the contact button 4a and the connecting member 5 are connected spot welding or by carrying out soldering so that it may project, the circuit board 4 may be inserted into wall 2b and the undersurface of the connecting member 5 which projected and projected the contact button 4a from wall 2b may be touched. After inserting the connection projections 6a in the connecting hole 4b of the circuit board 4, the connecting member 6 is connected to a connecting hole 4b portion by spot welding or soldering (drawing 5).

[0022] Thus, where the circuit board 4 is connected to each terminal of the battery cell 2, the resin molding part 3 is fabricated. In order to fabricate the resin molding part 3, as shown in drawing 6, the adjustment catch 11 and the adhesion lid 12 which fix the battery cell 2 are used. The adjustment catch 11 is a container made from an aluminum alloy, and has the seat part 11a for supporting so that said battery cell 2 may not fall, for example. This seat part 11a is in the state where the opening tip of the battery cell 2 was made to project, and has the capacity of the grade which accommodates the battery cell 2.

[0023] The adhesion lid 12 is a lid-like member made from an aluminum alloy, and as shown in drawing 9, it is provided with the insulating member 12a and the ejection nozzle 12b, for example. The insulating member 12a is a member for preventing the electric short circuit by the external connection terminal and projecting wall part 2b of the connector 7 contacting the adhesion lid 12, and is provided in the field which the edge of the connector 7 and projecting wall part 2b sticks among the surfaces of the adhesion lid 12. The ejection nozzle 12b is formed in the inside of the adhesion lid 12. The exit wound of the ejection nozzle 12b is established in the center section of the field in which the insulating member 12a is installed.

[0024] Said battery cell 2 is accommodated in the seat part 11a of the adjustment catch 11 as shown in drawing 7. And as shown in drawing 8 and drawing 9, the adhesion lid 12 is stuck to the edge of projecting wall part 2b of the battery cell 2, and the external connection terminal of the connector 7. Thereby, the cavity closed with the obturation board 2a, projecting wall part 2b, and the adhesion lid 12 is formed. In this state, melting resin is ejected from the ejection nozzle 12b toward the inside of this cavity. If it fills up with melting resin in a cavity, in order for the heat of melting resin to project promptly and to conduct to a wall etc., it is cooled quickly and melting resin in a cavity is hardened.

[0025] Thereby, the battery 1 which has the resin molding part 3 which wrapped in the circuit board 4 is manufactured by the hollow surrounded by projecting wall part 2b of the battery cell 2. The adhesion lid 12 is separated from the battery 1 next, and a manufacturing process is completed by picking out the battery 1 from the adjustment catch 11. In this battery 1, since the adhesion lid 12 had stuck during manufacture at the connector 7, only the end face of the connector 7 is exposed to the surface of the resin molding part 3 of the battery 1.

[0026] Since the obturation board 2a and projecting wall part 2b of the battery cell 2 are used for demarcation of a cavity according to the manufacturing method of the battery 1 of the above-mentioned embodiment, there is an advantage that it is not necessary to use the metallic mold which has complicated cavity form.

[0027] Although the anode and the negative pole terminal are arranged in the battery 1 of said embodiment to the external connection terminal of the connector 7 for connecting with a personal digital assistant, Instead of the connector 7, the negative pole terminal part which projects from the surface of the resin molding part 3 is provided, and the whole surface of the battery cell 2 may be operated as a positive pole terminal. Thus, by a negative pole terminal and a positive pole terminal being mutually provided in the field of the opposite hand of a battery, as a battery puts each of that terminal, a personal digital assistant can be equipped with it. Although it projected over the perimeter around the obturation board 2a of the battery cell 2 and wall 2b was provided, it may project only in a part of circumference of the obturation board 2a, or the position which counters on both sides of the obturation board 2a, and wall 2b may be provided.

[0028] In the manufacturing method of the battery 1 of said embodiment, since projecting wall part 2b was provided in the circumference of the obturation board 2a over the perimeter, used the adhesion lid 12 which demarcates only the whole surface of a cavity, but. What is necessary is just to use the metallic mold which can demarcate cavity surfaces other than the cavity surface by this projecting wall part 2b, when projecting wall part 2b is provided only in the part in around the obturation board 2a. Although the surface of the adhesion lid 12 which touches the external connection terminal of the connector 7 is equipped with the insulating member 12a, an insulating

member may be directly stuck on an external connection terminal.

[0029]

[Effect of the Invention] This invention has the following effects so that clearly from the above explanation. According to the invention concerning claim 1, the side of a resin molding part projects and it is supported by the wall, and the adhesion area of a battery cell and a resin molding part increases, and since a possibility that a resin molding part will drop out of a battery cell can be reduced, the soundness of a battery can be held.

[0030] According to the invention concerning claim 2, support a resin molding to the external force which acts on the direction opposing of these projecting wall part, and. It can project with a resin molding part also to the external force of the direction which intersects perpendicularly with this, adhesive strength with a wall can be heightened, and a resin molding part and a battery cell can be fixed still more firmly.

[0031] According to the invention concerning claim 3, since all the sides of a resin molding part project and it is protected by the wall, it avoids that external force carries out a direct action to this side, therefore the effect that omission from the battery cell of a resin molding part can be prevented more certainly is done so.

[0032] Since cavity form of a metallic mold can be made simple according to the invention concerning claim 4, the effect that reduction of product cost can be aimed at is done so.

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TECHNICAL FIELD

[Field of the Invention]Especially this invention relates to the art which improves the reliability and productivity of a battery about the manufacturing method of a battery and a battery.

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PRIOR ART

[Description of the Prior Art]Conventionally, the battery used for personal digital assistants, such as a portable telephone and a personal handy phone machine, is equipped with the battery cell of approximately rectangular parallelepiped shape, and the circuit board electrically connected to each terminal of this battery cell, and there are some which fixed these in one with resin in it.

[0003]Said battery cell is constituted by enclosing with an electrolysis solution what laminated the anode film separated with the separator in the container which carries out deep drawing of the aluminum material, and the two or more layers negative-electrode film with an obturation board. The negative pole terminal is arranged by state protruding in that center at this obturation board.

[0004]Said circuit board is a thing for the charge control of a battery cell, and electrical protection. The surface of said battery cell is pasted with the double-sided tape.

The flat side is chosen in order to secure sufficient adhesion area by a double-sided tape, while being considered as the side in which the thickness direction of a battery cell is met, in order to prevent the thickness of a battery from increasing the adhesion position to the battery cell of the circuit board. The circuit board is attached to the side contiguous to a negative pole terminal from the necessity of connecting with the negative pole terminal which projects in the one side face of a battery cell.

[0005]The circuit board is connected to each terminal of a battery cell by metal connection plates. This connection plate is prolonged toward the adjoining negative pole terminal and positive pole terminal of the side, respectively from the both ends of the long and slender circuit board allotted covering the overall length of a battery cell.

By carrying out soldering of each tip to each terminal, the circuit board and a battery cell are connected electrically and mechanically.

Therefore, these connection plates will be arranged so that said battery cell may be held. And the circuit board and the connection plate which were fixed in this way are wrapped in by the resin molding part, and are united with the battery cell.

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EFFECT OF THE INVENTION

[Effect of the Invention]This invention has the following effects so that clearly from the above explanation. According to the invention concerning claim 1, the side of a resin molding part projects and it is supported by the wall, and the adhesion area of a battery cell and a resin molding part increases, and since a possibility that a resin molding part will drop out of a battery cell can be reduced, the soundness of a battery can be held.

[0030]According to the invention concerning claim 2, support a resin molding to the external force which acts on the direction opposing of these projecting wall part, and. It can project with a resin molding part also to the external force of the direction which intersects perpendicularly with this, adhesive strength with a wall can be heightened, and a resin molding part and a battery cell can be fixed still more firmly.

[0031]According to the invention concerning claim 3, since all the sides of a resin molding part project and it is protected by the wall, it avoids that external force carries out a direct action to this side, therefore the effect that omission from the battery cell of a resin molding part can be prevented more certainly is done so.

[0032]Since cavity form of a metallic mold can be made simple according to the invention concerning claim 4, the effect that reduction of product cost can be aimed at is done so.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]However, in the conventional battery constituted in this way, since the circuit board and a connection plate were arranged on the side of the battery cell, the surface of a battery cell will be covered with the circuit board or a connection plate, and there was a problem that adhesion area with a resin molding part decreased. For this reason, a resin molding part may drop out with external force. Since the resin molding part was fabricated covering the 3 sides of a battery cell, the battery cell needed to be made buried in the inside of a metallic mold, and the resin molding part needed to be fabricated. For this reason, the metallic mold which has complicated cavity form was used, and there was a problem that the product cost of a battery became high. This invention is made in view of the situation mentioned above, and aims at improvement in the reliability of a battery, and productivity.

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MEANS

[Means for Solving the Problem]In order to solve an aforementioned problem, an invention concerning claim 1, A battery cell and the circuit board electrically connected to each terminal of this battery cell, It is a battery unified by a resin molding part which wraps in this circuit board, and a battery with which a resin molding part has stuck at least some walls of a container which constitutes a battery cell to a projecting wall part made to project from the one adjoining surface which adjoins this wall is proposed.

[0008]According to this invention, adhesion area of a battery cell and a resin molding part can be made to increase, when the surface of a battery cell and an inner surface of a projecting wall part paste a resin molding part. A rigid high projecting wall part can be made to support the side of a resin molding part. As a result, adhesive strength of a battery cell and a resin molding part is increased, and it becomes possible to hold so that a resin molding part may not drop out of a battery cell to the side to this external force in a resin molding part.

[0009]An invention concerning claim 2 has proposed a battery formed in a position which said projecting wall part counters across said adjoining surface two places in the battery according to claim 1. According to this invention, a resin molding part inserted into two projecting wall parts which counter, A resin molding part is supported to external force concerning direction opposing of these projecting wall part, and it can project with a resin molding part also to external force of a direction which intersects perpendicularly with this, adhesive strength with a wall can be heightened, and mounting strength of a resin molding part and a battery cell can be improved further.

[0010]An invention concerning claim 3 has proposed a battery with which said projecting wall part is provided in the circumference on said surface of adjoining over the perimeter in the battery according to claim 1 or 2. According to this invention, it can project, the side of a resin molding part can be covered with a wall over the perimeter, and external force can be prevented from being directly added to this side.

[0011]It is in a state which an invention concerning claim 4 is a manufacturing method of the battery according to any one of claims 1 to 3, and electrically connected said circuit board to each terminal of said battery cell, A manufacturing method of a battery which pours in and stiffens melting resin in a cavity demarcated around the circuit board using said adjoining surface and said projecting wall part is proposed.

[0012]According to this invention, by demarcating a cavity using a projecting wall part, a cavity surface formed by a metallic mold can be lessened, and a metallic mold can be made simple. If it projects over the perimeter on the surface of adjoining and a wall is formed especially, a cavity surface which should be formed with a metallic mold is set to one, and can use a metallic mold of simple shape like a lid which closes a tip opening of a projecting wall part instead of a metallic mold which wraps in a battery cell.

[0013]

[Embodiment of the Invention]Hereafter, one embodiment of the battery concerning this invention is

described with reference to drawing 9 from drawing 1. Drawing 1 is a perspective view showing the appearance of the battery 1 concerning this embodiment. The battery 1 is used for personal digital assistants, such as a portable telephone, and is constituted by the battery cell 2 and the resin molding part 3.

[0014]The battery cell 2 is a lithium ion battery, and as shown in drawing 2, it has the container and the obturation board 2a of rectangular parallelepiped shape made from aluminum by which deep-drawing shaping was carried out, for example. The separator and electrode which are not illustrated are enclosed with the inside of said container with the electrolysis solution. Said obturation board 2a is a lid-like member for sealing the opening of this container.

[0015]It projects in the center section of the obturation board 2a from the surface of this obturation board 2a, and the negative-electrode cap 2c is formed in it. The negative-electrode cap 2c is electrically insulated to the obturation board 2a. Said obturation board 2a constitutes one on the surface of the minimum area among the surfaces of the battery cell 2 where a project area is the smallest.

[0016]The obturation board 2a was inserted from the opening tip of a container to the position of a prescribed depth, and has sealed the container by carrying out a girth weld to a container there. That is, the obturation board 2a constitutes the adjoining surface contiguous to the container wall side of a battery cell, and constitutes projecting wall part 2b in which the portion from the obturation board 2a to an opening tip projects from the adjoining surface among container side walls. In the battery cell 2 constituted in this way, all the other surfaces where the negative-electrode cap 2c contained the obturation board 2a and projecting wall part 2b as a negative pole terminal function as a positive pole terminal, respectively.

[0017]Said resin molding part 3 has wrapped in the circuit board 4 and the connecting members 5 and 6, as shown in drawing 2. The circuit board 4 has the area of the grade which is less than the size of the obturation board 2a of the battery cell 2, and carries the connector 7 grade suitable electronic parts and for external connection. These electronic parts are parts for performing charge control of the battery 1, etc. Said circuit board 4 counters the obturation board 2a of the battery cell 2, and is arranged, and it is connected to the battery cell 2 via the connecting members 5 and 6. The contact button 4a and the connecting hole 4b as shown in drawing 3 are established in the circuit board 4. The wiring (graphic display abbreviation) led from said connector 7 grade is connected to the contact button 4a and the connecting hole 4b.

[0018]The connecting members 5 and 6 bend metal plates, are formed in the shape of an L character, and are electrically connected to the positive pole terminal and negative pole terminal of the circuit board, respectively as shown in drawing 3. The connection projections 6a for inserting in the connecting hole 4b of the circuit board 4 are formed in the end of the connecting member 6, and it is electrically connected to wiring of the circuit board 4 by inserting these connection projections 6a in the connecting hole 4b, and attaching by soldering etc.

[0019]According to the battery 1 of this embodiment, the resin molding part 3 is surrounded by projecting wall part 2b of the battery cell 2 in the circumference. As a result, the side of the resin molding part 3 is not outside exposed, and external force is not directly added to this side. Since rigid high projecting wall part 2b supports the resin molding part 3, even against the external force which acts on the resin molding part 3 indirectly, the resin molding part 3 can be protected and it can prevent the resin molding part 3 dropping out of the battery cell 2.

[0020]Since the placed opposite of the circuit board 4 is carried out to the minimum area surface of the battery cell 2, it can make volume of the resin molding part 3 small rather than arranged on which other surfaces. For this reason, the increase in the volume of the battery 1 is suppressed to the minimum, and the small weight saving of the battery 1 can be realized. Since there is little quantity of the resin which the resin molding part 3 takes and it ends, product cost is reducible.

[0021]Next, the manufacturing method of the battery 1 in this embodiment is explained using drawing 9 from drawing 4. In order to manufacture the battery 1 of this embodiment, the connecting

members 5 and 6 are first attached to the inner surface of projecting wall part 2b of the battery cell 2, and the negative-electrode cap 2c by spot welding or soldering, respectively (drawing 4).

Subsequently, it is made to slide in from the slanting upper part, and the contact button 4a and the connecting member 5 are connected spot welding or by carrying out soldering so that it may project, the circuit board 4 may be inserted into wall 2b and the undersurface of the connecting member 5 which projected and projected the contact button 4a from wall 2b may be touched. After inserting the connection projections 6a in the connecting hole 4b of the circuit board 4, the connecting member 6 is connected to a connecting hole 4b portion by spot welding or soldering (drawing 5).

[0022] Thus, where the circuit board 4 is connected to each terminal of the battery cell 2, the resin molding part 3 is fabricated. In order to fabricate the resin molding part 3, as shown in drawing 6, the adjustment catch 11 and the adhesion lid 12 which fix the battery cell 2 are used. The adjustment catch 11 is a container made from an aluminum alloy, and has the seat part 11a for supporting so that said battery cell 2 may not fall, for example. This seat part 11a is in the state where the opening tip of the battery cell 2 was made to project, and has the capacity of the grade which accommodates the battery cell 2.

[0023] The adhesion lid 12 is a lid-like member made from an aluminum alloy, and as shown in drawing 9, it is provided with the insulating member 12a and the ejection nozzle 12b, for example. The insulating member 12a is a member for preventing the electric short circuit by the external connection terminal and projecting wall part 2b of the connector 7 contacting the adhesion lid 12, and is provided in the field which the edge of the connector 7 and projecting wall part 2b sticks among the surfaces of the adhesion lid 12. The ejection nozzle 12b is formed in the inside of the adhesion lid 12. The exit wound of the ejection nozzle 12b is established in the center section of the field in which the insulating member 12a is installed.

[0024] Said battery cell 2 is accommodated in the seat part 11a of the adjustment catch 11 as shown in drawing 7. And as shown in drawing 8 and drawing 9, the adhesion lid 12 is stuck to the edge of projecting wall part 2b of the battery cell 2, and the external connection terminal of the connector 7. Thereby, the cavity closed with the obturation board 2a, projecting wall part 2b, and the adhesion lid 12 is formed. In this state, melting resin is ejected from the ejection nozzle 12b toward the inside of this cavity. If it fills up with melting resin in a cavity, in order for the heat of melting resin to project promptly and to conduct to a wall etc., it is cooled quickly and melting resin in a cavity is hardened.

[0025] Thereby, the battery 1 which has the resin molding part 3 which wrapped in the circuit board 4 is manufactured by the hollow surrounded by projecting wall part 2b of the battery cell 2. The adhesion lid 12 is separated from the battery 1 next, and a manufacturing process is completed by picking out the battery 1 from the adjustment catch 11. In this battery 1, since the adhesion lid 12 had stuck during manufacture at the connector 7, only the end face of the connector 7 is exposed to the surface of the resin molding part 3 of the battery 1.

[0026] Since the obturation board 2a and projecting wall part 2b of the battery cell 2 are used for demarcation of a cavity according to the manufacturing method of the battery 1 of the above-mentioned embodiment, there is an advantage that it is not necessary to use the metallic mold which has complicated cavity form.

[0027] Although the anode and the negative pole terminal are arranged in the battery 1 of said embodiment to the external connection terminal of the connector 7 for connecting with a personal digital assistant, Instead of the connector 7, the negative pole terminal part which projects from the surface of the resin molding part 3 is provided, and the whole surface of the battery cell 2 may be operated as a positive pole terminal. Thus, by a negative pole terminal and a positive pole terminal being mutually provided in the field of the opposite hand of a battery, as a battery puts each of that terminal, a personal digital assistant can be equipped with it. Although it projected over the perimeter around the obturation board 2a of the battery cell 2 and wall 2b was provided, it may project only in a part of circumference of the obturation board 2a, or the position which counters on

both sides of the obturation board 2a, and wall 2b may be provided.

[0028]In the manufacturing method of the battery 1 of said embodiment, since projecting wall part 2b was provided in the circumference of the obturation board 2a over the perimeter, used the adhesion lid 12 which demarcates only the whole surface of a cavity, but. What is necessary is just to use the metallic mold which can demarcate cavity surfaces other than the cavity surface by this projecting wall part 2b, when projecting wall part 2b is provided only in the part in around the obturation board 2a. Although the surface of the adhesion lid 12 which touches the external connection terminal of the connector 7 is equipped with the insulating member 12a, an insulating member may be directly stuck on an external connection terminal.

[Translation done.]

* NOTICES *

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is a perspective view showing the battery concerning one embodiment of this invention.

[Drawing 2]It is a sectional view of the battery of drawing 1.

[Drawing 3]It is an exploded perspective view decomposing and showing the resin molding part of the battery of drawing 1.

[Drawing 4]It is a perspective view showing the setting-up procedure of the battery of drawing 1.

[Drawing 5]It is a perspective view showing the state before resin molding part shaping of the battery of drawing 1.

[Drawing 6]It is a perspective view showing the manufacturing process which fabricates the resin molding part of the battery of drawing 1.

[Drawing 7]It is a perspective view showing the manufacturing process which fabricates the resin molding part of the battery of drawing 1.

[Drawing 8]It is a perspective view showing the manufacturing process which fabricates the resin molding part of the battery of drawing 1.

[Drawing 9]It is a sectional view showing the manufacturing process which fabricates the resin molding part of the battery of drawing 1.

[Description of Notations]

1 Battery

2 Battery cell

2a Adjoining surface

2b Projecting wall part

3 Resin molding part

4 Circuit board

[Translation done.]

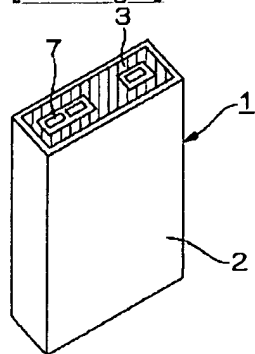
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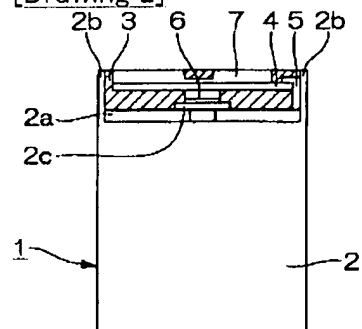
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- 3.In the drawings, any words are not translated.

DRAWINGS

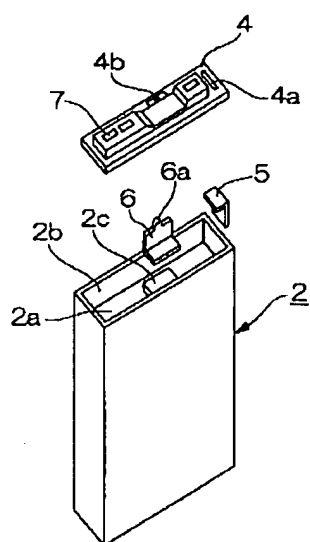
[Drawing 1]



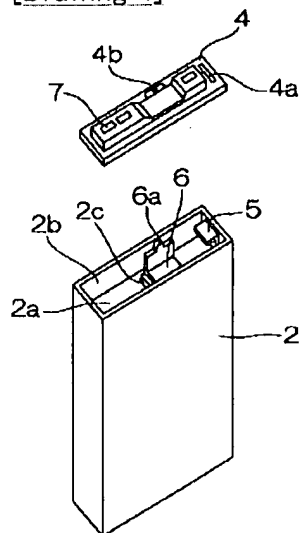
[Drawing 2]



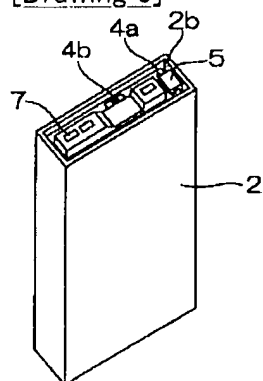
[Drawing 3]



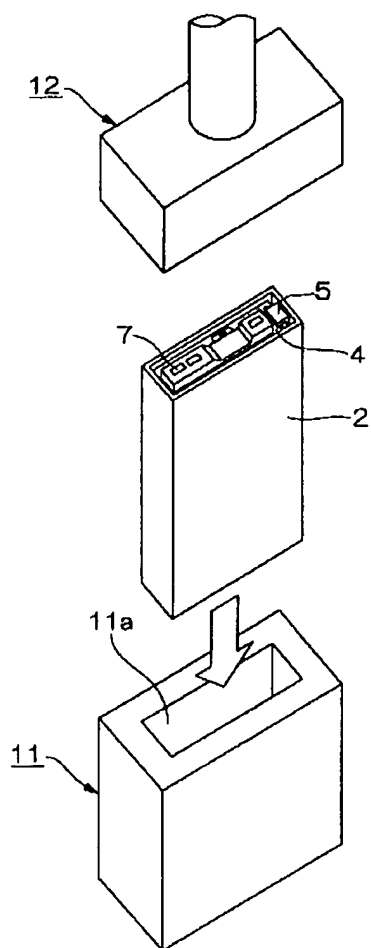
[Drawing 4]



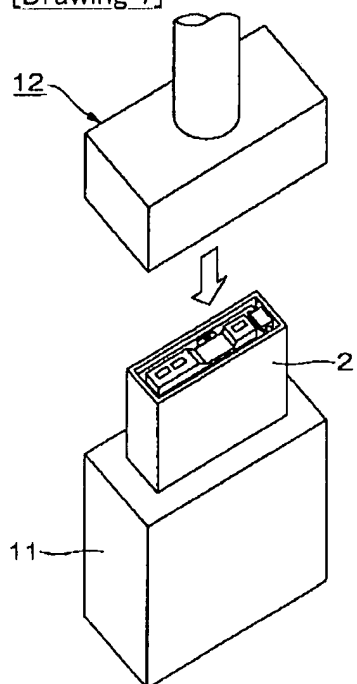
[Drawing 5]



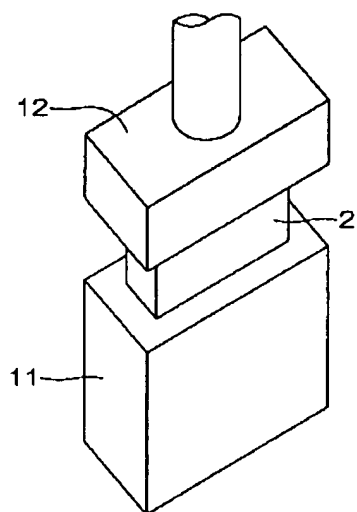
[Drawing 6]



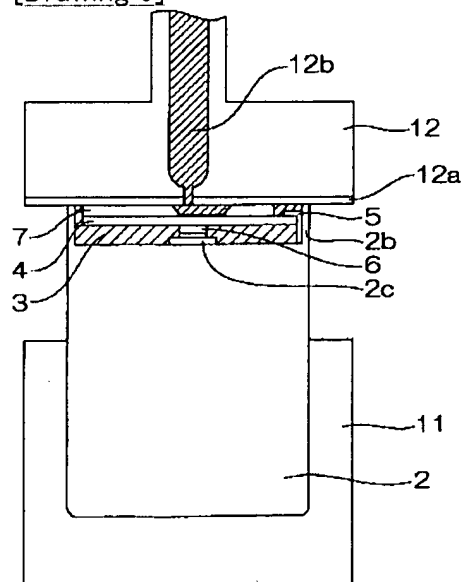
[Drawing 7]



[Drawing 8]



[Drawing 9]



[Translation done.]

PATENT ABSTRACTS OF JAPAN

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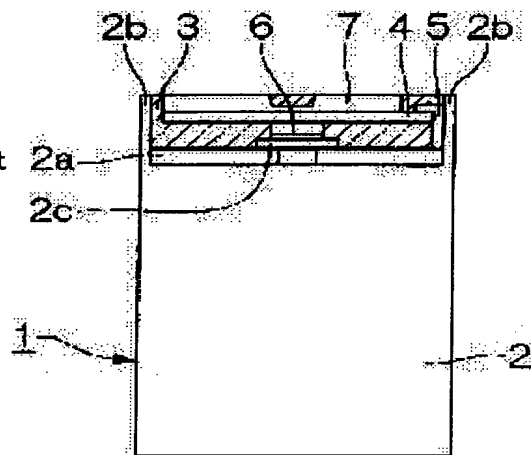
(72)Inventor : HIROTA HIROYUKI

(54) BATTERY AND ITS MANUFACTURING METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To improve reliability and productivity of a battery.

SOLUTION: It is the battery 1 which is constituted by integrating to unify the battery cell 2 and a circuit board 4 electrically connected to each terminal of this battery cell 2 by a resin mold part 3 which wraps this circuit board 4. The battery is provided, in which the resin mold part 3 is adhered to a projecting wall part 2b, which is formed by projecting at least one part of the wall of the container, which constitutes the battery cell 2, from one adjoining surface 2a, which adjoins this wall.



(43)公開日 平成15年1月24日(2003.1.24)

(51) Int.Cl.⁷
H 0 1 M 2/10

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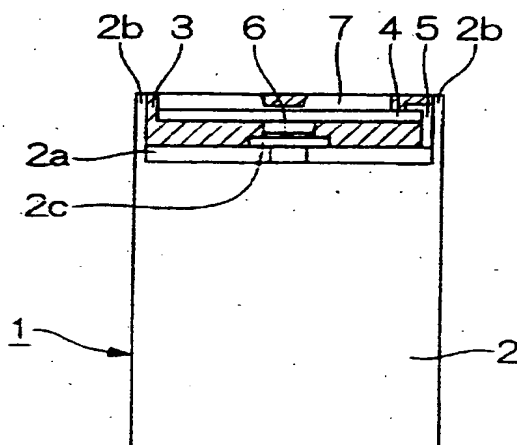
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(54) 【発明の名称】 バッテリーとその製造方法

(57)【要約】

【課題】 バッテリーの信頼性および生産性の向上を図る。

【解決手段】 バッテリーセル２と、このバッテリーセル２の各端子に電気的に接続される回路基板４とを、該回路基板４を包み込む樹脂モールド部３によって一体化してなるバッテリー１であって、バッテリーセル２を構成する容器の壁の少なくとも一部を、この壁に隣り合う一つの隣接表面２aから突出させた突出壁部２bに樹脂モールド部３が密着しているバッテリーを提供する。



【特許請求の範囲】

【請求項1】 バッテリーセルと、このバッテリーセルの各端子に電気的に接続される回路基板とを、該回路基板を包み込む樹脂モールド部によって一体化してなるバッテリーであって、

バッテリーセルを構成する容器の壁の少なくとも一部をこの壁に隣り合う一つの隣接表面から突出させた突出壁部に、樹脂モールド部が密着しているバッテリー。

【請求項2】 前記突出壁部が、前記隣接表面を挟んで対向する位置に2箇所設けられている請求項1に記載のバッテリー。

【請求項3】 前記突出壁部が、前記隣接表面の周囲に全周にわたって設けられている請求項1または請求項2に記載のバッテリー。

【請求項4】 請求項1から請求項3のいずれかに記載のバッテリーの製造方法であって、前記回路基板を前記

バッテリーセルの各端子に電気的に接続した状態で、前記隣接表面および前記突出壁部を利用して回路基板の周囲に画定したキャビティ内に溶融樹脂を注入して硬化させるバッテリーの製造方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は、バッテリーおよびバッテリーの製造方法に関し、特に、バッテリーの信頼性および生産性を向上する技術に係るものである。

【0002】

【従来の技術】従来、携帯電話機、簡易型携帯電話機等の携帯端末に用いられるバッテリーには、略立方体状のバッテリーセルと、このバッテリーセルの各端子に電気的に接続される回路基板とを備え、これらを樹脂によって一体的に固定したものがある。

【0003】前記バッテリーセルは、アルミニウム材を深絞り加工してなる容器内に、セパレータによって分離された正極フィルムと負極フィルムとを複数層積層したものを電解液と共に封口板によって封入することにより構成されている。この封口板には、その中央に、負極端子が突出状態に配置されている。

【0004】前記回路基板は、バッテリーセルの充電制御および電気的保護のためのものであり、前記バッテリーセルの表面に両面テープにより接着されている。回路基板のバッテリーセルへの接着位置は、バッテリーの厚みが増加することを防止するために、バッテリーセルの厚さ方向に沿う側面とされとともに、両面テープによる十分な接着面積を確保するために、平坦な側面が選択されている。また、回路基板は、バッテリーセルの一側面に突出する負極端子と接続する必要から、負極端子に隣接する側面に取り付けられている。

【0005】さらに、回路基板はバッテリーセルの各端子に金属製の接続板によって接続されている。この接続板は、バッテリーセルの全長にわたって配されている細

長い回路基板の両端から、隣接する側面の負極端子および正極端子に向かってそれぞれ延びており、それぞれの先端を各端子に半田付されることにより、回路基板とバッテリーセルとを電気的および機械的に接続するようになっている。したがって、これら接続板は、前記バッテリーセルを抱え込むように配置されることになる。そして、このように固定された回路基板および接続板が、樹脂モールド部によって包み込まれ、バッテリーセルと一体化されている。

【0006】

【発明が解決しようとする課題】しかしながら、このように構成される従来のバッテリーでは、バッテリーセルの側面に回路基板および接続板を配していたために、バッテリーセルの表面が回路基板や接続板で覆われてしまい、樹脂モールド部との接着面積が少なくなるという問題があった。このため、樹脂モールド部が外力によって脱落する可能性がある。また、バッテリーセルの3側面にわたって樹脂モールド部を成形していたため、バッテリーセルを金型の内部に埋没させて樹脂モールド部を成形する必要があった。このため、複雑なキャビティ形状を有する金型を使用し、バッテリーの製品コストが高くなるという問題があった。この発明は上述した事情に鑑みてなされたものであって、バッテリーの信頼性および生産性の向上を目的としている。

【0007】

【課題を解決するための手段】上記課題を解決するために、請求項1に係る発明は、バッテリーセルと、このバッテリーセルの各端子に電気的に接続される回路基板とを、該回路基板を包み込む樹脂モールド部によって一体化してなるバッテリーであって、バッテリーセルを構成する容器の壁の少なくとも一部をこの壁に隣り合う一つの隣接表面から突出させた突出壁部に、樹脂モールド部が密着しているバッテリーを提案している。

【0008】この発明によれば、バッテリーセルの表面および突出壁部の内面が樹脂モールド部に接着することによって、バッテリーセルと樹脂モールド部との接着面積を増加させることができる。また、剛性の高い突出壁部に樹脂モールド部の側面を支持させることができる。その結果、バッテリーセルと樹脂モールド部との接着力を増大させ、樹脂モールド部に側方からかかる外力に対して、樹脂モールド部がバッテリーセルから脱落しないように保持することが可能となる。

【0009】また、請求項2に係る発明は、請求項1に記載のバッテリーにおいて、前記突出壁部が、前記隣接表面を挟んで対向する位置に2箇所設けられているバッテリーを提案している。この発明によれば、対向する2つの突出壁部に挟まれた樹脂モールド部は、これら突出壁部の対向方向にかかる外力に対して樹脂モールド部を支持すると共に、これに直交する方向の外力に対しても樹脂モールド部と突出壁部との接着力を高めて、樹脂モ

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ールド部とバッテリーセルとの取り付け強度をさらに向上することができる。

【0010】また、請求項3に係る発明は、請求項1または請求項2に記載のバッテリーにおいて、前記突出壁部が、前記隣接表面の周囲に全周にわたって設けられているバッテリーを提案している。この発明によれば、樹脂モールド部の側面を突出壁部によって全周にわたって被覆し、該側面に外力が直接加わることを防止することができる。

【0011】また、請求項4に係る発明は、請求項1から請求項3のいずれかに記載のバッテリーの製造方法であって、前記回路基板を前記バッテリーセルの各端子に電気的に接続した状態で、前記隣接表面および前記突出壁部を利用して回路基板の周囲に画定したキャビティ内に溶融樹脂を注入して硬化させるバッテリーの製造方法を提案している。

【0012】この発明によれば、突出壁部を利用してキャビティを画定することにより、金型により形成されるキャビティ面を少なくして、金型を簡易なものとすることができる。特に、隣接表面の全周にわたって突出壁部を形成すると、金型によって形成すべきキャビティ面は一つとなり、バッテリーセルを包み込む金型に代わり、突出壁部の先端開口部を閉鎖する蓋のような単純形状の金型を使用することができる。

【0013】

【発明の実施の形態】以下、この発明に係るバッテリーの一実施形態について図1から図9を参照して説明する。図1は、本実施形態に係るバッテリー1の外観を示す斜視図である。バッテリー1は携帯電話機等の携帯端末に使用されるものであり、バッテリーセル2と樹脂モールド部3とにより構成されている。

【0014】バッテリーセル2は、例えば、リチウムイオンバッテリーであり、図2に示されるように、深絞り成形されたアルミニウム製の直方体状の容器と封口板2aとを有している。前記容器内部には、図示しないセパレータおよび電極が電解液と共に封入されている。前記封口板2aは、該容器の開口部を密封するための蓋状部材である。

【0015】封口板2aの中央部には、該封口板2aの表面から突出して負極キャップ2cが設けられている。負極キャップ2cは、封口板2aに対して電気的に絶縁されている。前記封口板2aは、バッテリーセル2の表面のうち、投影面積が最も小さい最小面積表面の一つを構成している。

【0016】封口板2aは、容器の開口部先端から所定深さの位置まで挿入されて、そこで容器に周縁接されることにより容器を密封している。すなわち、封口板2aは、バッテリーセルの容器壁面に隣接する隣接表面を構成し、容器側壁のうち、封口板2aから開口部先端までの部分が隣接表面から突出する突出壁部2bを構成して

いる。このように構成されたバッテリーセル2では、負極キャップ2cが負極端子として、封口板2aおよび突出壁部2bを含んだその他の表面すべてが正極端子として、それぞれ機能するようになっている。

【0017】前記樹脂モールド部3は、図2に示されるように、回路基板4と接続部材5、6とを包み込んでいる。回路基板4は、バッテリーセル2の封口板2aの大きさに満たない程度の面積を有するものであって、適当な電子部品や外部接続用のコネクタ7等を搭載している。この電子部品は、バッテリー1の充電制御等を行うための部品である。前記回路基板4は、バッテリーセル2の封口板2aに対向して配置されと共に、接続部材5、6を介してバッテリーセル2に接続されるようになっている。回路基板4には、図3に示すような、接続端子4aおよび接続穴4bが設けられている。接続端子4aおよび接続穴4bには、前記コネクタ7等から導かれた配線（図示略）が接続されている。

【0018】接続部材5、6は、図3に示されているように、例えば、金属製の板材を折り曲げて、L字状に形成されており、それぞれ回路基板の正極端子および負極端子に電気的に接続されるものである。また、接続部材6の一端には、回路基板4の接続穴4bに挿入するための接続突起6aが設けられ、該接続突起6aを接続穴4bに挿入して半田付等により取り付けることにより回路基板4の配線に電気的に接続されている。

【0019】本実施形態のバッテリー1によれば、樹脂モールド部3は、その周囲をバッテリーセル2の突出壁部2bにより囲まれている。その結果、樹脂モールド部3の側面が外部に露出せず、該側面に外力が直接加わることがない。また、剛性の高い突出壁部2bが樹脂モールド部3を支持するので、樹脂モールド部3に間接的に作用する外力に対しても、樹脂モールド部3を保護し、樹脂モールド部3がバッテリーセル2から脱落することを防ぐことができる。

【0020】また、回路基板4は、バッテリーセル2の最小面積表面に対向配置されるので、他のいずれの表面に配置されるよりも、樹脂モールド部3の体積を小さくすることができる。このため、バッテリー1の体積の増加を最小限に抑え、バッテリー1の小型軽量化を実現できる。さらに、樹脂モールド部3に要する樹脂の量が少なくて済むので製品コストを削減できる。

【0021】次に、本実施形態におけるバッテリー1の製造方法について、図4から図9を用いて説明する。本実施形態のバッテリー1を製造するには、まず、接続部材5、6を、それぞれバッテリーセル2の突出壁部2bの内面および負極キャップ2cにスポット溶接または半田付によって取り付ける（図4）。次いで、回路基板4を突出壁部2b内に挿入し、その接続端子4aを突出壁部2bから突出した接続部材5の下面に接するように、斜め上方から滑り込ませ、接続端子4aと接続部材5と

をスポット溶接または半田付することにより接続する。さらに、接続突起6aを回路基板4の接続穴4bに挿入した上で、接続穴4b部分に接続部材6をスポット溶接または半田付によって接続する(図5)。

【0022】このようにしてバッテリーセル2の各端子に回路基板4を接続した状態で、樹脂モールド部3を成形する。樹脂モールド部3を成形するためには、図6に示すように、バッテリーセル2を固定する固定器具11および密着蓋12を使用する。固定器具11は、例えば、アルミニウム合金製の容器であり、前記バッテリーセル2が倒れないように支持するための収容部11aを有している。該収容部11aは、バッテリーセル2の開

口部先端を突出させた状態で、バッテリーセル2を収容する程度の容積を有している。
【0023】密着蓋12は、例えば、アルミニウム合金製の蓋状部材であり、図9に示すように、絶縁部材12aと射出ノズル12bとを備えている。絶縁部材12aは、コネクタ7の外部接続端子および突出壁部2bが密着蓋12に接触することによる電気的な短絡を防止するための部材であり、密着蓋12の表面のうち、コネクタ7および突出壁部2bの縁が密着する面に設けられている。射出ノズル12bは、密着蓋12の内部に設けられている。また、射出ノズル12bの射出口は、絶縁部材12aが設置されている面の中央部に設けられている。

【0024】図7に示されているように、前記バッテリーセル2を固定器具11の収容部11aに収容する。そして、図8および図9に示されるように、バッテリーセル2の突出壁部2bの縁およびコネクタ7の外部接続端子に密着蓋12を密着させる。これにより、封口板2a、突出壁部2bおよび密着蓋12によって閉じられたキャビティが形成される。この状態で、射出ノズル12bから該キャビティ内に向かって溶融樹脂が射出される。キャビティ内に溶融樹脂が充填されると、直ちに溶融樹脂の熱が突出壁部等に伝導するため、キャビティ内の溶融樹脂は、急速に冷却され、硬化する。

【0025】これにより、バッテリーセル2の突出壁部2bによって囲まれた凹所に、回路基板4を包み込んだ樹脂モールド部3を有するバッテリー1が製造される。この後に、密着蓋12をバッテリー1から離し、バッテリー1を固定器具11から取り出すことにより製造工程が終了する。このバッテリー1では、製造中には密着蓋12がコネクタ7に密着していたために、バッテリー1の樹脂モールド部3の表面にはコネクタ7の端面のみが露出している。

【0026】上記実施形態のバッテリー1の製造方法によれば、バッテリーセル2の封口板2aおよび突出壁部2bをキャビティの面定に利用するので、複雑なキャビティ形状を有する金型を使用しなくて済むという利点がある。

【0027】なお、前記実施形態のバッテリー1では、

携帯端末に接続するためのコネクタ7の外部接続端子に正極および負極端子を配置しているが、コネクタ7の代わりに、樹脂モールド部3の表面から突出する負極端子部を設けると共に、バッテリーセル2の表面全体を正極端子として機能させてもよい。このように、負極端子と正極端子とが相互にバッテリーの反対側の面に設けられることで、バッテリーが、その各端子を挟み込むようにして携帯端末に装着されることができる。また、バッテリーセル2の封口板2aの周囲に全周にわたって突出壁部2bを設けていたが、封口板2aの周囲の一部のみに、あるいは封口板2aを挟んで対向する位置のみに突出壁部2bを設けてもよい。

【0028】また、前記実施形態のバッテリー1の製造方法では、突出壁部2bが封口板2aの周囲に全周にわたって設けられていたため、キャビティの一面のみを面定する密着蓋12を用いていたが、突出壁部2bが、封口板2aの周囲のうち、一部のみに設けられている場合には、該突出壁部2bによるキャビティ面以外のキャビティ面を面定できる金型を用いればよい。また、コネクタ7の外部接続端子に接する密着蓋12の表面に絶縁部材12aを備えるとしたが、外部接続端子に絶縁部材を直接貼り付けてもよい。

【0029】

【発明の効果】以上の説明から明らかなように、本発明は以下の効果をもつ。請求項1に係る発明によれば、樹脂モールド部の側面が突出壁部により支持されると共に、バッテリーセルと樹脂モールド部との接着面積が増加し、樹脂モールド部がバッテリーセルから脱落する可能性を低減できるため、バッテリーの健全性を保持することができる。

【0030】請求項2に係る発明によれば、これら突出壁部の対向方向に作用する外力に対して樹脂モールドを支持すると共に、これに直交する方向の外力に対しても樹脂モールド部と突出壁部との接着力を高めて、樹脂モールド部とバッテリーセルとをさらに強固に固定することができる。

【0031】請求項3に係る発明によれば、樹脂モールド部の側面すべてが突出壁部により保護されるため、該側面に外力が直接作用することを回避し、したがって、樹脂モールド部のバッテリーセルからの脱落をより確実に防止することができるという効果を奏する。

【0032】請求項4に係る発明によれば、金型のキャビティ形状を簡易なものとするので、製品コストの削減を図ることができるという効果を奏する。

【図面の簡単な説明】

【図1】 この発明の一実施形態に係るバッテリーを示す斜視図である。

【図2】 図1のバッテリーの断面図である。

【図3】 図1のバッテリーの樹脂モールド部を分解して示した分解斜視図である。

【図4】 図1のバッテリーの組み上げ手順を示す斜視図である。

【図5】 図1のバッテリーの樹脂モールド部成形前の状態を示す斜視図である。

【図6】 図1のバッテリーの樹脂モールド部を成形する製造過程を示す斜視図である。

【図7】 図1のバッテリーの樹脂モールド部を成形する製造過程を示す斜視図である。

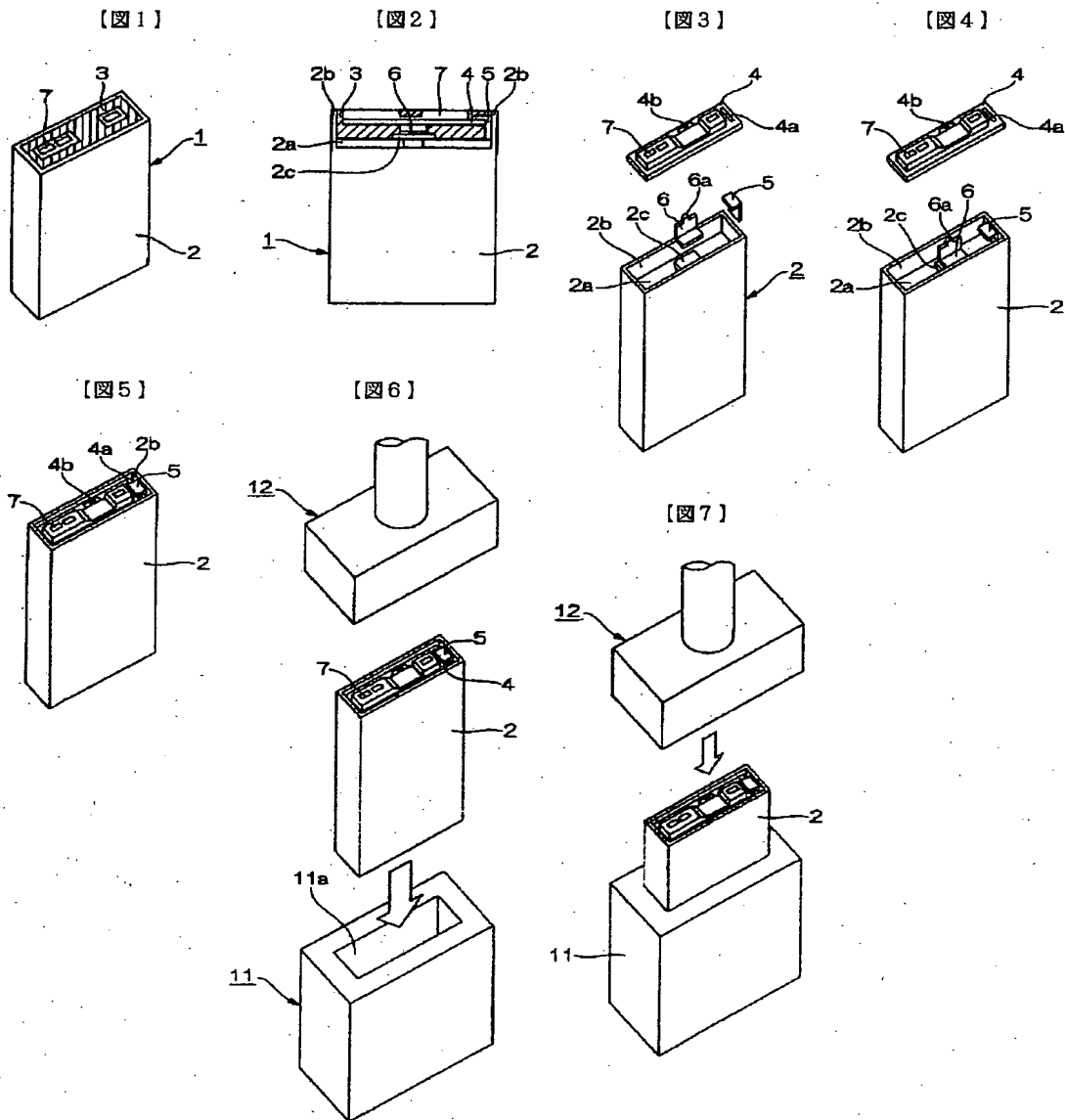
【図8】 図1のバッテリーの樹脂モールド部を成形する製造過程を示す斜視図である。

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*【図9】 図1のバッテリーの樹脂モールド部を成形する製造過程を示す断面図である。

【符号の説明】

- 1 バッテリー
- 2 バッテリーセル
- 2a 隣接表面
- 2b 突出壁部
- 3 樹脂モールド部
- 4 回路基板



【图9】

